

Claims

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- 3 1. An apparatus for routing or switching data packets, including
- 4 a router; and
- 5 an expanded M-trie data structure, said data structure having a set of nodes,
- 6 including a root node, inferior nodes and terminal nodes, wherein each node includes an
- 7 address and an opcode.
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- 9 2. An apparatus as in claim 1, wherein said data structure includes a
- 10 means for performing a lookup based on data included in a data packet.
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- 12 3. An apparatus as in claim 1, wherein said data structure includes a
- 13 means for performing a lookup of data included in a packet header.
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- 15 4. An apparatus as in claim 1, wherein said data structure includes a
- 16 means for performing a lookup of data included in an IP packet header.
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- 19 5. An apparatus as in claim 1, wherein said opcode describes an opera-
- 20 tion to be performed based upon data included in a packet header so as to facillitate
- 21 lookup of said packet header.
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1 6. An apparatus as in claim 1, wherein said address includes the address
2 of a said node in said expanded M-trie data structure that is to be traversed.

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5 7. An apparatus as in claim 1, wherein said expanded M-trie data
6 structure includes a set of access control parameters.

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8 8. An apparatus as in claim 1, wherein said expanded M-trie data
9 structure includes a set of QoS parameters.

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11 9. An apparatus as in claim 1, wherein said expanded M-trie data
12 structure includes a set of CoS parameters.

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14 10. An apparatus as in claim 1, wherein said nodes include opcodes for
15 demultiplexing, matching, hashing and other specialized instructions.

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17 11. An apparatus as in claim 10 wherein said opcodes for demulti-
18 plexing include instructions to demultiplex into said M-trie plus branches based on the
19 contents of one or more bytes included in a data packet.

1 12. An apparatus as in claim 10 wherein said opcodes for demultiplexing
2 include instructions to demultiplex into said M-trie plus branches based on the contents of
3 one or more bytes included in a packet header that that is being read.

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5 13. An apparatus as in claim 10 wherein said opcodes for demultiplexing
6 include instructions to demultiplex into said M-trie plus branches based on the contents of
7 one or more bytes included in an IP packet header that that is being read.

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9 14. An apparatus as in claim 10, wherein said opcodes for matching in-
10 clude instructions to compare the contents of a byte in the packet label to given node data.

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12 15. An apparatus as in claim 10, wherein said opcodes for hashing in-
13 clude instructions to hash into different M-trie plus branches based on the contents of a
14 byte in said packet header 122.

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16 16. A method for routing or switching data packets, including steps of
17 receiving a data packet at an input interface on a router or switch;
18 looking up information in the header of said data packet in an expanded M-
19 trie data structure;
20 terminating said lookup; and
21 routing said data packet at one or more output interfaces on said router or
22 said switch.

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2 17. A method as in claim 16, wherein said expanded M-trie data struc-
3 ture includes a root node, inferior nodes and a terminal node, each node including an ad-
4 dress and an opcode.

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6 18. A method as in claim 17, wherein said opcode describes an operation
7 to be performed is based upon data included in a packet header, so as to facillitate lookup
8 of said packet header.

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10 19. A method as in claim 17, wherein said address includes the address of
11 a said node in said expanded M-trie data structure that is to be traversed.

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13 20. A method as in claim 16, wherein said expanded M-trie data struc-
14 ture includes a set of access control parameters.

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16 21. A method as in claim 16, wherein said expanded M-trie data struc-
17 ture includes a set of QoS parameters.

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19 22. A method as in claim 16, wherein said expanded M-trie data struc-
20 ture includes a set of CoS parameters.

1 23. A method as in claim 17 wherein said nodes include opcodes for
2 demultiplexing, matching, hashing and other specialized instructions.

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4 24. An apparatus as in claim 23 wherein said opcodes for demultiplexing
5 include instructions to demultiplex into said M-trie plus branches based on the contents of
6 a byte of said packet header that is being read.

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8 25. A method as in claim 23, wherein said opcodes for matching include
9 instructions to compare the contents of a given byte of the packet label to given node
10 data.

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12 26. A method as in claim 23, wherein said opcodes for hashing include
13 instructions to hash into different M-trie plus branches based on the contents of a given
14 byte in said packet header 122.